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Research Article

Functional Evaluation after the Treatment of Brachymetatarsia through Bone Lengthening With Callotaxis by One Year of Follow-Up in Adult Patients

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Abstract

Introduction: The brachymetatarsia is the shortening of one or more metatarsal bones can be of genetic origin or traumatic, in adult life causes problems in the biomechanics of the foot causing transfer metatarsalgia and functional limitation in the march.

There are few global studies about your treatment in adults it is important to find a functional and technical and repeatable for its management in this population.

General Objective: To determine that the bone elongation by callotaxis in adults improving foot function and metatarsalgia.

Material and Methods: Study prospective, observational, cross-sectional sampling of non-randomized for convenience.

Population 29 patients older than 16 years, the service of foot and ankle deformities and neuromuscular of the NRI, until December 2013, with a brachymetatarsia which have been operated on with the technical callotaxis elongation through, to assess the pain and the functionality were used the AOFAS scales and VAS prior to surgery, in the postsurgical and 12 months.

Analysis: descriptive statistics were calculated by estimating frequencies, percentages, measures of central tendency and dispersion. Were used Excel and SPSS v. 21.

Results: Improved the VAS in a 60.08% being of presurgical way of a 6.89 and a 2.75 year of surgery. The AOFAS improved in a 51.32% being of way of a preoperative, 41.34 and 80.55 for a year of post-operative patients admitted.

Conclusions: The elongation of the metatarsals by callotaxis is a therapeutic option that provides satisfactory results for the treatment in adult patients.

Keywords: *Brachymetatarsia; Callotaxis; Metatarsalgia; Distraction*

Abbreviations: NRI: National Rehabilitation Institute of Mexico; AOFAS: American Orthopaedics Foot and Ankle society; VAS: visual Analogue Scale

Introduction

The brachymetatarsia is the shortening of one or more metatarsals and can be in one or both feet, this condition is relatively common and before it was offered as treatment in most cases the simple observation [1,4,9].

This condition has been observed in patients with syndromes such as Turner or Down. The cases are acquired by trauma or post-surgical [2,3,5,14].

The fourth metatarsal is the most commonly affected, and predominates in addition in the female sex, not is usually observed at birth, appear during development after the first 5 years of life, and it has been observed a direct relationship with the premature closure of the distal epiphysis of growth [2,5,8].

In the world studies have been conducted about the management of this disease with minifixators in pediatric patients, however there is little information about this type of treatment in adult patients [1,7,9,10].

The objective of this work is to present a series of cases with brachymetatarsia in adult patients treated by elongation by callotaxis and assess the functionality and the pain in these [2,9,11].

Materials and Methods

A prospective descriptive study was conducted, observational, cross-sectional sampling of non-randomized by convenience, data were obtained on the basis of the Division of foot and ankle in patients with brachymetatarsia surgically treated for bone elongation by callotaxis in NRI until December 2013, reviewed the electronic file to gather information and form the basis of data.

After a year of the procedure was applied to them the scale of AOFAS and VAS.

We included all patients older than 16 years with cases with brachymetatarsia treaties in the Division of ankle, foot of NRI until December 2013.

The variables that we analyzed were sex, metatarsal most affected, average of elongation, time-of-use of minifixator, complications of AOFAS scale, and VAS.

The inclusion criteria were patients with cases with brachymetatarsia come to rating to the Division of foot and ankle deformities with neuromuscular pain, with 16 years of age without prior surgical treatment, without data from osteoarthritis. Exclusion criteria were surgical treatment prior, arthrosis. The criteria for eliminating non-locatable were patients, patients who do not have complete dossier.

The surgical treatment is carried out by means of boarding dorsolateral and helped through total fluoroscopic time locating the metatarsal affected, is entered in the first instance Shantz of 1.6 mm distal to the level that is routed to the base of the first metatarsal and immediately after the second Shantz next to the first, then put the template of the minifixator for metatarsal, and according to the template is entered the third fourth Shantz to level of the proximal metatarsal, after an incision is made of approximately 1 cm dorsal level and is located the metatarsal is concerned, performs an osteotomy With a drill and drill 2.7 mm, and an osteotome behind, with the purpose of carrying out the principles of the callotaxis, therefore it is recommended not to use sierra, once that is done the osteotomy starts the elongation and is displayed under total fluoroscopic time, subsequently performs compression of the same, is performed tenotomy of the extensor and flexor to prevent joint stiffness or subluxation of the metatarsophalangeal heel joint; is closed with stitches by planes and leaves suropodalic bandage Figure 1.

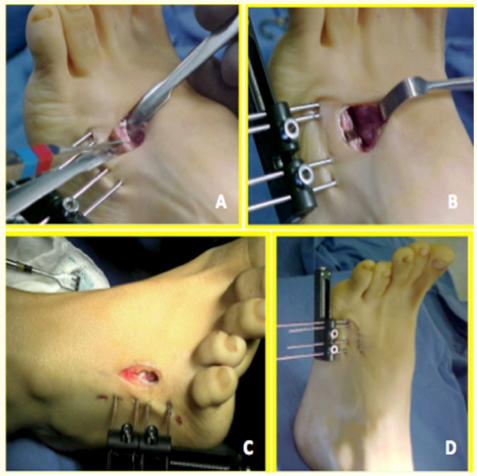

Figure 1: *A) osteotomy with drill. (B) checked the appropriate elongation. (C) performs compression. (D) is closed by planes.*

The postoperative management consists in 1st Stage: Home of the elongation to the progressive 8vo postsurgical day performing the elongation 1 mm a day/a quarter of a turn every 6 hours with ray weekly control until you reach the length planned; during the first phase is not recommended the support. The second stage consists of the consolidation of the regenerated bone and starts the support. The third stage consists of removing the fixative once you notice the bone consolidation and rehabilitation starts.

Descriptive statistics were calculated for the results.

Results and Discussion

There were 30 cases with brachymetatarsia post-operative patients admitted in the age group studied, after applying the criteria was eliminated by 1 patient not be locatable concluding the study with 29 patients, of whom 5 patients were on a bilateral patology and 2 patients with two metatarsals affected of these two one was of a patient with bilateral involvement remains a total of 37 operated metatarsals.

Of the patients included in the study it was observed which was most affected the metatarsal getting in all the cases affectation of the 4th metatarsal and in 2 cases in addition of the third metatarsal involvement, in regard to the sex most affected in the study found 27 women and 2 men affected. It was obtained an average of 20.13 mm elongation through callotaxis metatarsal, being 15 mm for less elongation and 25 mm for more. Complications were found in 5 metatarsals all resolved with a good final result taking a 86.48 per cent of metatarsals operated without complications.

It was noted that the average period of use of the for the callotaxis minifixator complete was 3.18 months being the best time of 2.5 months and the greater than 6 months. An improvement was observed average of the VAS a 60.08%, while watching an average of 6.89 for presurgical way to an average of VAS 2.75 of postsurgical manner. In terms of functionality is noted an improvement of 51.32% in the scale of the AOFAS being the average preoperative way a, 41.34 rising to an average of 80.55 so postoperative.

Discussion

In the studies by various authors, the goal of treatment of the cases with brachymetatarsia is correct the cosmetic deformity and achieve a correct metatarsal support, eliminating the pain. In our study it was observed an improvement in these two points being valued both with the scale of functionality of the scale of the AOFAS as well as the VAS showing an improvement of a 51.32 percent in the

scale of the AOFAS with average postoperative value of 80.52 and a 60.08% in the scale of Eva, with an average value of 2.75 this being equal to what is reported in literature [1,6,7].

The method that is based on the use of an external minifixator through which it is practiced callotaxis is not intended to supplant techniques recognized, if not to the contrary influences in the arsenal of media already therapeutic systems [4,12,14].

This pathology affects one or more Metatarsals and is predominant in the female sex, being the 4th metatarsal most commonly affected, sometimes occurs bilaterally or in two metatarsals of the same foot [2,5,9,16]. In our case study, of the 29 treated patients, 93% were women and only 7% in men, which is consistent with what is reported in the literature which goes with a percentage of 80 to 9% of women and with condition of the 4th metatarsal 100% of the cases, and in two cases in addition of the third metatarsal involvement which shows similarity in what is reported in the literature being the most affected the metatarsal 4 followed by the third with 80 per cent and 10 per cent, respectively, in our case being in greater percentage 4º [2,7,13].

The use of external minifixator for the treatment of cases with brachymetatarsia has been demonstrated by different authors with advantageous results. In this sense Wakisaka., *et al*. argues that the lengthening of a metatarsal through an external fixator is preferred to other techniques, considered an easy method to obtain excellent results both immediate as more late (functional) allowing an immediate mobilization of the ankle and can be carried out achieving early loading. The usual complications of this technique are intolerance, the deviation in varus-valgus bone treaty between other being these up to a 19.04%.21 [8,9,12].

In our study were presented complications in 5 procedures which is equivalent to a percentage of a 13.52% being this less than reported in the literature as well as the submitted all were resolved in a satisfactory manner by getting good aesthetic and functional results.

In a study published on the use of an external minifixator for callostasis, reported that the elongation was achieved in 16 days (16 mm), with a period of neutralization took 5 weeks, acquiring complete consolidation at 8 weeks, being removed from the external fixator in 10 weeks from the same start rehabilitation, gaining support metatarsal correct without any sequel painful, or joint stiffness, performing a physical activity and regular life normal [23].

In our study it was observed that the average period of use of the for the callotaxis minifixator complete was 12 weeks being the best time of 9 weeks m and the largest of 24 weeks, however our average elongation was higher being of average of 20.13 mm being 15 mm for less elongation and 25 mm for more.

Conclusion

The elongation of the metatarsals by callotaxis with external minifixator is a therapeutic option that provides satisfactory results for the treatment of cases with brachymetatarsia in adult patients Figure 2.

With this study we have shown that achieves restore anatomy and biomechanics of the normal foot. As well as improve the metatarsalgia and functionality.

Figure 2: *Final Outcome (A): Suitable support decreasing the metatarsalgia (B).*

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